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Abstract--A review of the exotic ungulate industry in Florida was made by mailing questionnaires to exotic ungulate permittees, phone interviews, interviews with exotic ungulate owner/managers, interviews with law enforcement wildlife inspectors, review of permit application forms on file with the Florida Game and Fresh Water Fish Commission, and review of the International Species Inventory System list. There were 3,649 wildlife exhibits, game farms, and hunting preserves in Florida. All of these are intensively managed pen operations where there is relatively little contact between exotic and native ungulates. Of these, 64 (2%) maintained a total of more than 6,000 exotic hoofed-animals representing 103 species. The number of new game farms with exotic ungulates has increased dramatically in the past 10 to 15 years. The most common species are fallow (*Cervus dama*), axis (*C. axis*), and sika (*C. nippon*) deer. These species have been shown to compete with native white-tailed deer in other states. The potential for competition probably is not as great in Florida. Florida has more of an abundance and diversity of vegetation types than most other states; therefore, even slight differences in food selection or habitat preferences would lessen competition between species. The biggest concern is the potential for introduction of diseases and parasites along with the exotic ungulates. Although there is not a market for the meat of exotic ungulates in Florida at this time, these animals are a potential source of high protein and low fat meat. Exotic ungulate operations in Florida provide additional income to some landowners, year-around hunting opportunity, preservation of threatened and endangered species, and non-consumptive recreational opportunities. The exotic ungulate industry needs to be monitored closely in the coming years, particularly with regards to diseases and parasites.

The introduction of exotic wildlife has followed Europeans wherever they have traveled. However, early attempts to acclimatize exotic birds and mammals were largely unplanned and uncontrolled. These attempts usually resulted in species being released but disappearing completely. The few species that were successfully established either became pests or made substantial contributions

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as recreational and economic assets (Phillips 1928, Laycock 1966, Bump and Robbins 1966, Morrill 1988).

The introduction of exotic wild ungulates has also been marked with success. Fallow (*Cervus dama)*, sika (*C. nippon*), axis (*C. axis*), and sambar deer (*C. unicolor*) and aoudad (barbary) sheep (*Ammotragus lervia*) are successfully established in the wild in many parts of the United States. The blackbuck (*Antilope cervicapra*), eland (*Taurotragus oryx*), and zebra (*Equus* spp.) also appear to be successfully acclimatizing. The number of species and total number of animals established continues to increase (Morrison 1988).

Exotic ungulates present a challenge to natural resource managers. While considering the potential economic values of these animals, care must be taken to properly consider how exotic ungulates may interact with native wildlife and domestic livestock (Demarais and Osborn 1989). Because the potential for harm to native animals, particularly white-tailed deer (*Odocoileus virginianus*), and their habitats is so great, wildlife agencies and the private sector must develop strict requirements for their husbandry (Teer 1991).

There had never been a survey of exotic ungulates in Florida, and little was known about this industry. The objective of this study was to evaluate the current status of the exotic ungulate industry in Florida and evaluate the potential for detrimental impacts on native wildlife.

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METHODS

Hunting preserve permit holders are required each year to fill out a harvest report form for the FGFWFC. These reports, for the hunting seasons 1987-88 through 1990-91, were reviewed to determine which hunting preserves had exotic ungulates. Also, lists of hunting preserve, game farm, and wildlife exhibit permit holders were reviewed with B. L. Cook (Wildlife Inspections, FGFWFC) to identify those permit holders that possibly held exotic ungulates. Questionnaires were mailed to 70 permit holders identified as potentially maintaining exotic ungulates. These questionnaires sought information on the property and facilities, the native and exotic stock present, and management issues (Appendix A). The questionnaire was followed by a phone interview with respondents that had exotic ungulates and a phone survey of non-respondents.

Five hunting preserves and 11 game farms which contained exotic deer that might compete with native white-tailed deer were visited, and the owners were

interviewed. Permit applications on file with the FGFWFC as well as the International Species Inventory System (ISIS) list were reviewed for further information on owners of exotic ungulates, number of species, and number of animals within Florida. This information was summarized by type of operation (hunting preserve, game farm, or wildlife exhibit) and by region of the state (1st = South, 2nd = Northeast, 3rd = Northwest, 4th = Everglades, 5th = Central; Fig. 1). The literature was reviewed for information concerning exotic ungulates and competition with native wildlife, particularly white-tailed deer.

RESULTS

Nineteen of the 70 questionnaires were returned; 5 of these were returned as undeliverable due to insufficient address information, and 14 (22%) were completed and returned with useable information. Twelve additional questionnaires were completed by personal interviews for a total of 26 usable returns. These represented 12 game farms, 9 wildlife exhibits, and 5 hunting preserves. It was determined from the completed questionnaires, the review of permit application forms, and the ISIS list that 64 (2%) of the 3,649 wildlife exhibits, game farms, and hunting preserves in Florida maintained exotic ungulates (Table 1). A larger proportion of game farms and hunting preserves (7%) maintained exotic ungulates than did wildlife exhibits (1%) (Table 2). The majority (57%) of operations maintaining exotic ungulates are found in the 2nd and 5th regions.

More than 6,000 exotic hoofed-animals representing greater than 100 species and subspecies are maintained in Florida (Table 3). Many more are moved through the state with travelling exhibits, and an unknown number are temporarily kept in Florida during winter months by out-of-state operators. Seven species make

up approximately 60% of these exotic ungulates. They include fallow, axis, and sika deer, sheep (various hybrids), Spanish goats, blackbuck antilope, and American bison (*Bison bison*). These 7 species make up 94%, 76%, and 23% of the exotic ungulates found on hunting preserves, game farms, and wildlife exhibits, respectively. The 1st, 2nd, and 5th regions contained 80% of these animals (Table 4). Wildlife exhibits maintain a larger number of species but a smaller average number of animals per species (26) than do game farms (54) or hunting preserves (75).

The number of new exotic ungulate operations per year has increased dramatically in the past 10 to 15 years. The growth rate for wildlife exhibits has remained fairly even, and that for hunting preserves has only slightly increased; thus the major portion of the annual increase in exotic ungulate operations can be attributed to game farms (Fig. 2). Based on the 26 completed questionnaires, 92% of the game farms that possess exotic ungulates have acquired them since 1980. These trends apparently had an effect on responses to the question: "Do you think the demand and market for exotic ungulates is expanding, stable, or decreasing?". Seventy-eight percent of wildlife exhibit respondents had no opinion, hunting preserve respondents were fairly evenly divided between expanding and stable, and 75% of game farm respondents believed the demand and market were expanding.

The average game farm comprised 6,934 (S.D. 17,804, Range 10-60,000) acres with 141 (S.D. 162, Range 8-550) acres devoted to exotic ungulates and was 36% (S.D. 30, Range 0-80) wooded, 5% (S.D. 9, 0-25) brushy, and 57% (S.D. 33, Range 10-100) open. The average hunting preserve comprised 2,728 (S.D. 2,521, Range 400-6,700) acres with 848 (S.D. 528, Range 300-1,700) acres devoted to exotic

ungulates and was 53% (S.D. 15, Range 33-80) wooded, 13% (S.D. 11, Range 0-33) brushy, and 35% (S.D. 13, Range 10-50) open. The average wildlife exhibit comprised 144 (S.D. 191, Range 7-580) acres with 41 (S.D. 46, Range 0.06-120) acres devoted to exotic ungulates and was 23% (S.D. 28, Range 0-90) wooded, 4% (S.D. 10, Range 0-33) brushy, and 74% (S.D. 32, Range 10-100) open.

Fences for exotic ungulates were constructed of New Zealand high-tensile wire, hog or bull field wire, no-climb horse wire, or chainlink. The high-tensile and field wire fences were normally constructed with 2 48" layers for an 8' high fence, whereas the horse wire and chainlink fences were constructed of single 8' high fence wire. Fences were constructed on 3-4" round or square wood posts set on 10-15' centers. Fence types constructed on hunting preserves and game farms were high-tensile wire or field wire (73%), horse wire (14%), and chainlink (13%). Fences at wildlife exhibits were constructed of chainlink (89%), and field wire (11%). The cost of fencing with New Zealand high-tensile wire, based on figures provided by 2 game farms, was between $1.64 and $2.00 per linear-foot. The cost of field fence (approximately $80/330' roll) would be considerably less than the cost of New Zealand high-tensile wire (approximately $300/330' roll).

Sixty percent of hunting preserves, 33% of wildlife exhibits, and 25% of game farms reported having had exotic ungulates escape. The majority of the time animals escape from hunting preserves and game farms, they can be baited back into the pen, but those that are not recaptured are shot by the owner or by locals. Animals that escape their pen in most wildlife exhibits and some game farms are still within a perimeter fence and are herded back into their pen.

The majority (73%) of exotic ungulate operations do not mark their hoofed-animals in any way. The 7 operations that do mark their exotic ungulates are intensively managed game farms (4) and wildlife exhibits (3). These operations mark their animals with a combination of ear tags, color coded collars, tatoos, and implantable transponders. These 7 operations were also the only ones that said they would support a regulation that all exotic ungulates be permanently marked.

None of the operations reported major problems with parasites or diseases. One of the game farms had been quarantined due to a suspected tuberculosis case; however, it was determined to be a test false-positive. Sixty percent of hunting preserves, 64% of game farms, and 100% of wildlife exhibits have a consulting veterinarian or a full-time veterinarian on staff. Quarantine facilities are present on 36%, 40% and 67% of game farms, hunting preserves, and wildlife exhibits, respectively. Two operations reported problems with depredation by dogs and coyotes (*Canis latrans*), 2 reported problems with depredation by bald eagles (*Haliaeetus leucocephalus*) (one of these reported losing 50-75 fawns per year), and the Seminole Indian Reservation reported loosing approximately 75 exotic ungulates to Florida panthers (*Felis concolor coryi*). Seven of the operations reported problems with poaching and vandalism. Much of these problems involved people shooting exotic ungulates at night and leaving them or cutting holes in the fences to recover illegally killed animals. Many of the exotic ungulate operations in Florida developed from the landowner's personal interest in exotics followed by the necessity to dispose of surplus animals. Marketing of the majority of these surplus animals is done through commercial sport hunting

and the sale of live animals for breeding stock. To a much lesser extent, these animals are marketed for their meat or other by-products.

The average number of exotic ungulates harvested per year on each hunting preserve was: sheep - 67 (S.D. 5.6, Range 62-75), fallow deer - 63 (S.D. 13.0, Range 53-81), goats - 36 (S.D. 7.4, Range 28-46), axis deer - 26 (S.D. 8.3, Range 17-37), blackbuck antelope - 15 (S.D. 5.4, Range 9-22), sika deer - 8 (S.D. 0.8, Range 7-9), bison - 1 (S.D. 0.8, Range 0-2), and elk (*Cervus canadensis*) - 1 (S.D. 0.5, Range 0-1). Prices for these animals were: goat - $150 to $360; sheep - $250 to $1,500 depending on species and variety; fallow, axis, sika deer and blackbuck antelope - $750 to $1,000; elk - $1,500 to $3,500; and bison - $2,000. This price included field dressing, skinning, preparation of the trophy for the taxidermist, and preparation of meat for the cooler. Lodging and guide fees ranged from $75 to $150 per person per day. Hunting was conducted on a "guaranteed basis." That is, the hunter paid for what he harvested. One hunting preserve operator stated that his biggest product was the "Florida cracker" life-style and hunting experience. Three of the hunting preserves offered rustic hunting cabins for overnight accommodations.

There does not appear to be a market for the meat of exotic ungulates at this time in Florida. One game farm operator was working on an arrangement with a local restaurant to provide fallow deer venison, and one hunting preserve/game farm operator had plans to start producing jerky, slim-jims, and summer sausage utilizing exotic ungulate meat. Live fallow deer were being sold for $650 to $750.

White-tailed deer populations were found on 80%, 75%, and 22% of hunting preserves, game farms, and wildlife exhibits, respectively. Of the 7 operations

in which the white-tailed deer shared habitat with exotic ungulates, 4 (57%) of the white-tailed populations were lower than those on surrounding land and 3 (43%) had populations the same as surrounding land. Of the 8 operations in which the white-tailed deer did not share habitat with exotic ungulates, 4 of the white-tailed populations were higher than surrounding land and 4 were the same.

Only 7 questionnaire respondents made suggestions for changes to present regulations dealing with exotic ungulates. Two respondents suggested that deer and bison farming be taken out of the FGFWFC jurisdiction and put under the Department of Agriculture, 2 suggested that new applicants be better screened to make it harder for unqualified people to acquire or possess exotic ungulates (or other exotics), 1 suggested that the minimum care standards for each family of ungulates as described by the AAZPA be adopted, 1 suggested that all exotic ungulates be permanently marked, and 1 stated that they did not want to see any laws or regulations passed that would make exotic game farms and hunting preserves legal in the state of Florida.

DISCUSSION

Potential negative aspects of exotic ungulates in Florida include competition with native wildlife, especially white-tailed deer, and parasite and disease complications. Three deer species -- sika, axis, and fallow -- have been identified as major competitors of white-tailed deer. In studies on the Kerr Wildlife Management Area in Texas, equal numbers of white-tailed deer and sika deer and of white-tailed deer and axis deer were put into 96-acre deer-proof enclosures. After nine years without human interference, there were 15 axis deer and only 3 white-tailed deer in the axis/whitetail enclosure, and 62 sika deer and 0 white-tailed deer in the sika/whitetail enclosure (Baccus et al. 1985).

On Assateague Island in Maryland, numbers of white-tailed deer dropped as numbers of sika deer increased (Keiper 1985, Keiper et al. 1984).

Sika, axis, and fallow deer prefer browse over grass when it is available, and they consume similar browse species as do white-tailed deer. However, they readily adapt to grass when browse and forbs (broadleaf plants often called weeds which live for one year) become scarce or unavailable (Armstrong et al. 1982, Butts et al. 1982, Sorola et al 1982). The exotics are better able to digest grass (Henke et al. 1988), whereas white-tailed deer are physiologically stressed by nutritional deficiencies (Baccus et al. 1985). Nutritional deficiencies affect the productivity of female deer by lowering conception rates, by increasing *in utero* mortality, and by increasing the mortality of new-born fawns (Verme and Ullrey 1984).

By examining 532 deer stomach samples collected during the fall and winter months from 25 wildlife management areas located throughout Florida, Harlow and Jones (1965) identified acorns and palmetto berries (when available) as the most heavily consumed foods with mushrooms next, woody plant leaves and twig ends third, forbs fourth, and grasses last. They stated that deer in Florida have access to what appears to be an unlimited supply of food provided by a number of vegetation types and a variety of plant species. The potential for competition between exotic deer and white-tailed deer, therefore, may not be as intense in Florida as in other states.

Studies of co-existing populations of white-tailed deer, axis deer, fallow deer, and sika deer in Texas (Corn et al. 1989, Richardson and Demarais 1990); white-tailed deer and fallow deer in Kentucky (Davidson et al. 1985); white-tailed deer and sika deer in Maryland and Virginia (Davidson and Crow 1983); and

white-tailed deer and sambar deer in Florida (Davidson et al. 1987) have all shown that the exotics are better able to withstand infectious diseases and parasitism than the native. A relationship between body condition, nutritional plane, and incidence of infectious diseases and parasites has been suggested (Davidson et al. 1987).

There is, in some cases, a hazard of native parasites and diseases to exotic species (White 1987). All fallow deer checked in Kentucky had inflammatory lesions in the spinal cord and/or brain that were attributed to prior infection with meningeal worm (*Parelaphostrongylus tenuis*) (Davidson et al. 1985). However, the meningeal worm has only been found once in Florida (Forrester 1992) and is not a common parasite anywhere in the coastal plain of the southeastern U.S.A. (Anderson and Prestwood 1981). Also, the giant liver fluke (*Fascioloides magna*) was found to cause extensive damage to the livers of blackbuck that shared habitat with white-tailed deer in Texas (Mungall 1978). This parasite is found in 3 main endemic areas in Florida: the southeastern panhandle, east-central Florida, and in southern Florida (Forrester 1992). It was noted that owners of hunting preserves and game farms visited in this study had varying degrees of success with raising blackbuck. The giant liver fluke may play a major role in the thriftiness of blackbuck where they share moist lowland or swampy habitat with white-tailed deer.

Another, and perhaps more important, consideration is the potential introduction of diseases and parasites from exotic ungulates to native wildlife. A game farming symposium was held in January, 1991, in Boise, Idaho (Hillman 1991), to explore known and potential problems, diseases, and concerns of game farming. Six bacterial diseases, 8 viral diseases, and 8 parasites were listed

as of major concern to wildlife and agricultural agencies with regards to commercial game ranch and game farm animals in the western states (Table 5).

The exotic ungulate industry is presently in the midst of a serious world-wide outbreak of bovine tuberculosis (TB), and the disease is spreading rapidly through game ranches across North America (Merritt 1992). Members of the cervid family, particularly elk and deer, are very susceptible to the disease when intensively farmed. One of the problems associated with the detection of TB is that there is a long period when infected animals do not show clinical signs. The number of animals potentially exposed increases as infected animals are bought, sold, and traded, and when the exposed animals are then moved, the problem is further accelerated. Exotic auctions appear to be a classic environment for exposure to this and many other diseases. Native wildlife could be exposed by escaped exotics, by native deer getting inside game farm enclosures, and by nose-to-nose contact through fences. The possible ramifications of TB for free-ranging wildlife are relatively unknown. When cattle herds are infected with TB, the USDA's Animal and Plant Health Inspection Service has authority to quarantine and test animals, to destroy any herd found to contain test positive animals, and to compensate ranchers for slaughtered cattle (Merritt 1992). Although USDA does not now possess this authority with regard to exotic ungulates, the present TB outbreak will speed the process toward that end. The Florida Legislature passed legislation in spring 1990 revising state statutes relating to the Division of Animal Industry. This legislation included hoofed animals such as deer and elk under the definition of livestock for the purpose of providing more consistent regulation of the deer farming industry as it develops (Conner 1990).

Deer are naturally very resistant to many of the disease and parasite conditions that domestic livestock face. However, the key to this disease resistance is proper nutrition (Buckmaster 1988). Standard operating procedure on hunting preserves and game farms should be to maintain healthy animals through good nutrition, quarantine of new animals to lessen the chance of introducing a harmful disease or parasite into the operation, and to use the services of a veterinarian on a routine basis to monitor and conduct a disease surveillance program (White 1987).

Escapes of exotic ungulates will occur under the best of fencing and management conditions. Aside from escapes, exotic ungulates may be intentionally released from confinement following transfer of land ownership or after individuals have grown tired of the novelty of a private zoo (Ramsey 1968). Available data suggests that in the United States escaped exotic ungulates have a high probability of becoming established, increasing in numbers, spreading widely, and being difficult to control (Dasmann 1968). Aoudad are so numerous in New Mexico that they cannot be adequately censused, much less eliminated (Morrison 1988). Approximately 45% of the exotic ungulates in Texas are not behind game-proof fencing (Traweek 1989).

There are 3 areas in Florida where exotic ungulates are known to exist in the wild; 2 of these are islands. The first, St. Vincent Island, has the earliest record of exotic ungulates in Florida. Sika and sambar deer were introduced to this 12,353 acre barrier Island in 1908. Blackbuck, eland, and 2 varieties of zebra were introduced to this island in 1948. St. Vincent Island became a National Wildlife Refuge in 1968, and all exotic ungulates except the sambar deer either no longer survived or were removed from the island (Lewis et

al. 1990). Stable populations of approximately 175 sambar and 365 white-tailed deer are maintained on the island at this time (Flynn et al. 1990). Although there is a 38% dietary overlap between the two species (primarily browse), the food items common to both species are in abundant supply, and the two species occupy different niches. Sambar forage mostly in marsh habitats and white-tailed deer in terrestrial habitats. Therefore, the island supports considerably more deer biomass than if only one of the species were present (Shea et al. 1990).

The other island on which exotic ungulates are maintained is Brahma Island in Lake Kissimmee. Spanish goats were introduced onto this 4,200-ha island around 1912. Exotic sheep, fallow deer, axis deer, and blackbuck were introduced in 1974. These exotics are managed on the island by the Lightsy Brothers Cattle Co., which uses the island as a hunting preserve. There is not a population of white-tailed deer on this island (C. Lightsy 1992, pers. comm.).

The mainland area in Florida where exotic ungulates exist in the wild is at Silver Springs in Marion County. This area is presently owned by Florida Leisure Acquisition Corp. and Florida Department of Natural Resources. The original owners of Silver Springs introduced fallow and sika deer onto this property in 1959 for hunting purposes. The fallow deer have since been killed out, but the sika deer maintain a relatively stable population of between 15 and 25 animals. These animals do not appear to have had an effect on the white-tailed deer population in the area (S. Baer, Florida Department of Natural Resources, and L. Cheatom, Florida Leisure Acquisition Corp., 1992, pers. comm.).

Strode (in Presnall 1958) reported a population of axis deer in Duval, Flagler, St. Johns, and Volusia counties that reportedly developed from animals

that escaped from a pen in the 1930's. He stated that they were not open to hunting and were no problem. This population does not exist today.

Exotic ungulate operations in Florida serve to provide additional income to landowners, year-round hunting opportunity, a potential source of high protein and low fat meat, preservation of threatened and endangered species, and non-consumptive recreational opportunities. Increased human population densities, affluence, and leisure time and a decrease in available hunting areas have created problems with overcrowding and abusive behavior on wildlife management areas. This has created pressures for new hunting experiences and opportunities (Attebury et al. 1977). Many of these hunters seek landowners who will grant them exclusive use of an area for a fee (Morrill 1988). Exotic species offered by hunting preserves are viewed by some as one potential answer to their quest for more game and greater hunting opportunities (Bump 1968). In addition, the fall/winter hunting season for native game is only 50 days long, whereas exotic ungulates can be hunted the other 10 months of the year as well. A trip to a hunting preserve has many advantages over a foreign safari to some hunters. These include the cost of the safari, transportation costs, common language, no need for passports, and no bad food and undrinkable water (Hulme 1985).

The primary income from exotic ungulate game farms in Florida presently comes from the selling of trophy bucks to hunting preserves and surplus females and immature males as breeding stock. Although an exotic meat market does not currently exist, the potential is there. One of the major obstacles to the development of this market is the limited availability of venison in the marketplace. There are not enough animals being produced to stimulate a market. It is possible that with a larger supply and, therefore, lower prices, there

would be a greater demand. However, given the limited success of buffalo-burgers and kangaroo meat in this country and the present status of alligator meat in Florida, exotic venison may prove to be only a novelty item sold in select restaurants and specialty shops. As consumers become more aware of the nutritional benefits of exotic deer meat, however, it could develop into a large market in Florida.

According to the Texas Department of Agriculture (1989), the per capita consumption of beef in the United States has decreased from a high of 94.4 pounds per year in 1976 to 79.1 pounds in 1985. Consumption of poultry and fish increased during this same period . They felt that the decline in beef consumption was due to growing consumer awareness about the health risks associated with high levels of saturated fats accumulated through the consumption of red meat products. One of the best qualities of exotic venison is that it contains 33 percent fewer calories and 75 percent less fat than chicken with the skin left on (Texas Department of Agriculture 1989).

Exotic ungulate production would also be an alternative to farmers and ranchers who have suffered financial stress and economic hardship due to the expense of raising traditional domestic livestock (Texas Department of Agriculture 1989). Although there is a high initial investment with about a 5 to 10 year period to return the capital (Schreiner 1968), an increased source of revenue can be realized from these animals (Fuchs 1982). Exotic deer are more efficient converters of pasture to lean meat than cattle or sheep and require less labor-intensive farming (Finkelstein 1983). Additionally, exotic deer offer the advantages of shorter reproduction periods, less feed consumption, greater numbers of animals supportable per unit area, greater proportions of meat to

carcass weight, and comparatively higher profits (Texas Department of Agriculture 1989). Other by-products from exotic ungulates include antlers and antler velvet, hides, tails, eye teeth, sinews, and bacula (Finkelstein 1983).

Exotic ungulate operations can provide protected gene pools for endangered ungulate species. For example, blackbuck antelope, in danger of extinction in their native lands, are among the more popular species on American exotic ranches. There are probably more blackbuck antelope today in Texas alone than in all of India (Jackson 1964, Putman 1976, Attebury et al. 1977). Species Survival Plans have been established to enrich the genetics of captive endangered ungulates. These plans have been developed through the efforts of the African Fund for Endangered Wildlife and Game Conservation International, the American Association of Zoological Parks and Aquariums, and game farms and ranches in the United States (Winckler 1985, Demaris et al. 1990). In Florida, the White Oak Conservation Center, operated by the Howard Gilman Foundation, is one of the foremost breeding centers in North America (Lukas 1991).

One of the least used reasons for maintaining exotic ungulates is for the pleasure of viewing the animals. Several wealthy individuals have established exotic pens near their homes to be able to view those species that strike their fancy and to have "something different." Also, many thousands of paying tourists annually visit wildlife exhibits specializing in exotic ungulates in order to view and photograph these animals.

CONCLUSIONS AND RECOMMENDATIONS

Compared to states like Texas, which in 1988 had 164,000 exotic ungulates representing 67 species (Traweek 1989), Florida has a very small number of these animals. However, the number of game farms in Florida is growing rapidly. The

FGFWFC needs to monitor this industry closely. Since FGFWFC requires an annual permit for each operation, the easiest way to do this monitoring would be through an annual computer analysis of permit applications. This could easily be done by entering the name of the operation and the number of exotic animals by species into a database file. A quick tabulation each year would show trends in number of operations, number of species, and number of animals.

Game farms and hunting preserves maintain exotic deer that, in other states, have been shown to compete with white-tailed deer for browse. The potential for competition probably is not as great in Florida. Florida has more of an abundance and diversity of vegetation types than most other states; therefore, even slight differences in food selection or habitat preferences would lessen competition between species. However, the potential for a disease outbreak does exist. FGFWFC should maintain its jurisdiction over exotic ungulates and, as the lead agency, should work closely with the Department of Agriculture and Consumer Services in developing regulations for the prevention and control of diseases and parasites that could be brought into the state with these animals. The recommendations developed during the 1991 Boise, Idaho, Game Farming Symposium (Hillman 1991) should be taken into consideration when developing these regulations. These recommendations basically suggest that all exotic ungulates brought into the state be tested with specific tests for specific diseases within 30 days prior to entry into the state, and that the exotics be accompanied by an official certificate of veterinary inspection that includes the identification of each animal, results of required tests, certification information, and entry permit numbers. These animals should then be quarantined on site for 30 to 180 days depending on need for further tests.

Also pertaining to diseases and parasites, a necropsy examination, including histopathology of brain tissue, should be conducted for all exotic ungulates that die of unknown causes and wildlife and exotic animal auctions should be prohibited or discouraged. This last action should be done at least until a mechanism can be established whereby FGFWFC can assure that testing and other requirements are being met prior to sale.

FGFWFC should work toward having all exotic ungulates (if not all exotics) permanently marked. This could be done over a period of 5 to 10 years by requiring that all exotics coming into or moved within the state be permanently marked with a unique, metal, tamper-proof ear tag, official registry tattoo, or official registry electronic device. Exotic ungulate operators should be required to post a bond to ensure proper actions are taken if animals escape.

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Table 1. Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

REGION 1

Wildlife Exhibits

Octagon Sequence of Eight — Punta Gorda — Charlotte Co.
2 Hippopotamus, 1 Goat, 1 Pot-bellied Pig

Busch Entertainment/Zoo Dept. — Tampa — Hillsborough Co.
160 Thomson's Gazelle, 102 Barbados Sheep, 73 Impala, 70 Nyala, 48 African Pigmy Goat, 40 Grant's Gazelle, 34 Greater Kudu, 31 Grevy's Zebra, 25 Scimitar-horned Oryx, 25 Addra Gazelle, 24 Defassa Waterbuck, 20 Reticulated Giraffe, 19 Grant's Zebra, 19 Uganda Kob, 18 Swine, 17 Addax, 16 Dromedary Camel, 16 Soemmering's Gazelle, 15 Muntjac, 15 Dorcas Gazelle, 14 Sitatunga, 14 Springbok, 11 Eastern White-bearded Wildebeest, 11 Roan Antelope, 9 Blesbok, 5 Sable Antelope, 5 Cape Buffalo, 4 Llama, 3 Black-backed (Bay) Duiker, 3 Topi, 3 Hunter's Hartebeest, 2 Vietnamese Pot-bellied Pig, 2 Common Hippopotamus, 2 Black Rhinoceros, 2 Kirk's Dik-Dik, 1 Southern White Rhinoceros, 1 Ankole, 1 Baringo Giraffe

Lowry Park Zoological Garden — Tampa — Hillsborough Co.
14 Domestic Goat, 7 Domestic Sheep, 5 Arabian Oryx, 5 Bactrian Camel, 4 Llama, 4 Indian Muntjac, 4 Reeves Muntjac, 3 Wild Boar, 2 African Wild Ass, 2 American Bison, 1 Prairie Bison, 1 Indian Rhinoceros

Gloria J. Simpson — Trilby — Pasco Co.
2 Llama

Sarasota Jungle Gardens — Sarasota — Sarasota Co.
4 Goat

Douglas Harms — Englewood — Sarasota Co.
20 Pot-bellied Pigs

Game Farms

Hal H. Thompson — Arcadia — Desoto Co.
2 Zebra

Table 1 (Continued). Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

Palmarosa Ranch Bison	Englewood	Sarasota Co.
River Run Ranch 7 Elk	Sarasota	Sarasota Co.

Hunting Preserves

FX Bar Ranch 120 Axis Deer, 100 Fallow Deer, 50 Blackbuck, 32 Water Buffalo, 25 Sika Deer, 10 Ibex, 8 Red Deer, 6 Nilgai, 5 Elk, 4 Eland, 3 Bison, 2 Scimitar-horned Oryx, 2 Yak, 1 Addax, 1 Aoudad	Frostproof	Polk Co.
Lightsey Cattle Co. 200 Corsican Sheep, 120 Fallow Deer, 120 Catalina Goat, 75 Axis Deer, 12 Blackbuck	Lake Kissimmee	Polk Co.

REGION 2

Wildlife Exhibits

Lubee Foundation, Inc. 44 Watusi, 16 Impala, 14 European Wisent, 12 Sitatunga, 11 Llama, 8 Grevy's Zebra, 8 Gaur, 5 Waterbuck, 2 Springbok, 1 Camel, 1 Malayan Tapir	Gainesville	Alachua Co.
Camp Kulaqua 5 Fallow Deer, 1 Llama	High Springs	Alachua Co.
Reddick's Bird & Animal Farm 24 Llama, 14 Dutch Belt Cattle, 10 Jacops Sheep, 7 Shetland Ponies, 4 Donkey, 4 Dexter Cattle, 2 Miniature Zebues	Micanopy	Alachua Co.
Santa Fe Teaching Zoo 6 Collared Peccary, 5 Sika Deer, 5 Springbok, 5 Reeves Muntjac, 4 Guanaco	Gainesville	Alachua Co.

Table 1 (Continued). Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

Suwannee Valley Zoo & W/L Pk — Lake City — Columbia Co.
4 Miniature Sheep, 3 Pigmy Goat, 1 Sika Deer

Jacksonville Zoological Park — Jacksonville — Duval Co.
30 Goat, 12 Sitatunga, 7 Thomson's Gazelle, 7 Greater Kudu, 7 Common Eland, 7 Gemsbok, 6 Impala, 6 Sable Antelope, 6 Guanaco, 5 Common Zebra, 4 Southern White Rhinoceros, 3 Waterbuck, 3 Giraffe, 3 Cape Buffalo, 2 Gaur, 2 Kirk's Dik-Dik, 2 Blue Duiker, 2 Blue Wildebeest, 1 Sika Deer, 1 Domestic Horse

Endangered Species Zoo — Chiefland — Levy Co.
1 Camel

Game Farms

Elmer Heubeck — Rochell — Alachua Co.
200 Fallow Deer, 150 Sika Deer, 75 Axis Deer, 6 Blackbuck, 6 Eland, 6 Waterbuck, 6 Barasingha Deer, 5 Nilgai, 4 Impala

Bradford C. Lewis — Live Oak — Columbia Co.
21 White-tailed Deer, 5 Muntjac, 2 Mule Deer, 1 Dama Gazelle, 1 Zebra

Carter's Game Farm — Lake City — Columbia Co.
150 Fallow Deer, 45 Blackbuck, 25 Sika Deer, 14 Axis Deer

James E. Davis — Jacksonville — Duval Co.
110 Bison

Quina's Funny Farm — Branford — Gilchrist Co.
17 Fallow Deer

Edwina's Til-T-Til Farm — Mayo — Lafayette Co.
12 Blackbuck, 8 Axis Deer, 7 Sika Deer, 2 Fallow Deer

V. E. Whitehurst — Williston — Levy Co.
10 Bison, 6 Axis Deer, 4 Fallow Deer, 1 Elk

Table 1 (Continued). Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

White Oak Plantation Yulee Nassau Co.
26 Dama Gazelle, 24 Nyala, 22 Javan Banteng, 21 Gaur, 21 Bongo, 16 Bontebok, 13 Red Lechwe, 13 Gerenuk, 12 Scimitar-horned Oryx, 12 Reticulated Giraffe, 12 Roan Antelope, 11 Greater Kudu, 11 Grevy's Zebra, 8 Slender-horned Gazelle, 5 White Rhinoceros, 3 Forest Buffalo, 3 Okapi, 2 Giant Eland

GB Buffalo Ranch Perry Taylor Co.
10 Bison

Hunting Preserves

Carter's Pastures Lake City Columbia Co.
50 Fallow Deer, 50 Catalina Goat, 25 Sika Deer, 12 Blackbuck, 10 Axis Deer, 6 Elk

Suwannee Hunting Preserve Branford Lafayette Co.
12 Fallow Deer, 12 Corsican Sheep, 12 Goat, 12 Sika Deer, 2 Axis Deer

REGION 3

Wildlife Exhibits

Animal Park dba The Zoo Gulf Breeze Santa Rosa Co.
15 Blackbuck, 10 Barasingha Deer, 7 Axis Deer, 6 Fallow Deer, 4 Scimitar-horned Oryx, 4 Eland, 4 Sable Antelope, 3 Reeves Muntjac, 3 Roan Antelope, 3 Gemsbok, 3 Ankole, 2 Aoudad, 2 Grant's Zebra, 2 Waterbuck, 2 Giraffe, 2 White-bearded Wildebeest, 2 Addax, 2 Arabian Oryx, 1 Sitatunga, 1 Red Lechwe, 1 Asiatic Water Buffalo, 1 Bongo

Dale Chukker (Neonatal Care) Gulf Breeze Santa Rosa Co.
Blackbuck, Defassa Waterbuck, Red Lechwe, Eland, Camel, Scimitar-horned Oryx, Barasingha Deer, Fallow Deer

Table 1 (Continued). Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

Game Farms

Gerald Mason — Campbellton Jackson Co.
40 Bison

Tally Hills Wildlife Ranch — Lamont — Jefferson Co.
136 Fallow Deer

Watha E. Ard — Tallahassee Leon Co.
70 Sika Deer, 53 Red Deer/Elk, 30 Fallow Deer

Hunting Preserves

Wells Hunting Preserve — Jay — Santa Rosa Co.
75 Fallow Deer, 75 Axis Deer, 10 Goat, 9 Barbados Sheep, 5 Sika Deer, 3 Elk, 2 Blackbuck

REGION 4

Wildlife Exhibits

Jungle Larry's Safari Land — Naples — Collier Co.
7 Blackbuck, 4 Goats, 4 Llama, 2 Fallow Deer, 2 Pot-bellied Pigs, 2 Donkeys

Miami Metrozoo — Miami — Dade Co.
8 Thomson's Gazelle, 8 Axis Deer, 8 Maxwell's Duiker, 8 Nile Lechwe, 7 Impala, 7 Addra Gazelle, 7 Defassa Waterbuck, 7 Baird's Tapir, 7 Bongo, 7 Angolan Springbok, 7 Slender Horned Gazelle, 6 Fallow Deer, 6 Nyala, 6 Reticulated Giraffe, 6 Malayan Tapir, 6 Greater Kudu, 6 Sable Antelope, 6 Black Rhinoceros, 6 Kirk's Dik-Dik, 6 Chamois, 5 Scimitar-horned Oryx, 5 Java Banteng, 5 Red Sheep, 4 Indian Muntjac, 4 Addax, 4 Arabian Camel, 4 Pygmy Hippopotamus, 4 Persian Onager, 4 Grevy's Zebra, 3 Nilgai, 3 Blesbok, 3 Great Indian Rhinoceros, 3 Yellow-backed Duiker, 3 Grey Duiker, 3 Gerenuk, 3 Goral, 2 Goat, 2 Gaur, 2 Domestic Zebu, 2 Arabian Oryx, 2 Burmese Brow-Antlered Deer, 2 Chinese Water Deer, 2 Common Zebra, 1 Blackbuck, 1 Algerian Sand Gazelle, 1 Addra Gazelle, 1 Wild Boar, 1 Domestic Goat

Table 1 (Continued). Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

BR Ranch Jupiter Palm Beach Co.
27 Fallow Deer, 3 Axis Deer, 3 Blackbuck

Dreher Park Zoo West Palm Beach Palm Beach Co.
3 Brazilian Tapir, 2 Llama

Lion Country Safari,Inc. FL Loxahatchee Palm Beach Co.
74 Mouflon, 40 Waterbuck, 33 Pygmy Goats, 29 Nilgai, 28 Zebra, 22 Blackbuck, 21 Eland, 17 Wildebeest, 15 Aoudad, 15 Llama, 11 Nubian Goat, 10 Dall Sheep, 9 Watusi, 8 White Rhinoceros, 7 Giraffe, 6 Bison, 4 Addax, 4 Lechwe, 4 Domestic Sheep, 3 Donkey, 3 South American Tapirs, 3 Miniature Horse, 2 Reeves Muntjac, 2 Pot-bellied Pig, 2 Cape Buffalo, 2 Asiatic Buffalo, 2 Long Horn Cattle, 1 Arabian Oryx, 1 Oryx Cross, 1 Zebu, 1 Scottish Highlander

Game Farms

Richard E. Moore Naples Collier Co.
Barbados Sheep, Sicilian Donkey Pam Hawley
Naples Collier Co.
10 Pot-bellied Pigs, 2 Llamas

Seminole Tribe of Florida Immokalee Hendry Co.
50 Axis Deer, 25 Fallow Deer, 25 Mouflon, 25 Aoudad, 15 Sika Deer, 10 Goat, 4 Scimitar-horned Oryx, 2 Blackbuck, 1 Eland, 1 Nilgai

Adams Ranch, Inc. Ft. Pierce St. Lucie Co.
50 Axis Deer, 25 Sika Deer, 25 Blackbuck, 3 Waterbuck

Richard Ebner Ft. Pierce St. Lucie Co.
Mouflon

Table 1 (Continued). Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

REGION 5

Wildlife Exhibits

Brevard Zoological Park Melbourne Brevard Co.
20 Domestic Goat, 10 Fallow Deer, 8 Barbados Sheep, 6 Llama, 6 Dama Gazelle, 2 Giraffe, 2 Pig, 1 Abyssinian Ass

Finser Exotics Umatilla Lake Co.
10 Zebra, 1 Giraffe

Fla Leisure Acquisition Corp Silver Springs Marion Co.
47 Axis Deer, 26 Goats, 22 Mouflon, 19 Sika Deer, 16 Blackbuck, 13 Sheep, 8 Grant's Zebra, 8 Reticulated Giraffe, 7 Llama, 6 Scimitar-horned Oryx, 6 Aoudad, 5 Nilgai, 5 Fallow Deer, 4 Reeves Muntjac, 4 Oryx, 4 Impalas, 3 Addax, 3 Springbok, 3 Miniature Horse, 2 Sable Antelope, 2 Tapirs, 2 Scottish Highland Cattle, 1 Dromedary Camel, 1 Wild Boar, 1 Watusi

Mini Dream Acres Bird Ranch Ocala Marion Co.
2 Fallow Deer

Gatorland Zoo Orlando Orange Co.
4 Fallow Deer

Central Florida Zoological P Lake Monroe Seminole Co.
5 Domestic Goat, 5 Llama, 3 Scimitar-horned Oryx, 2 Addax, 1 Hippopotamus

St. Augustine Alligator Farm St. Augustine St. Johns
13 Fallow Deer

Savage Kingdom, Inc. Center Hill Sumter Co.
50 Fallow Deer, 10 Barbados Sheep, 6 Red Deer/Elk

Game Farms

Rubber Ranch Merritt Island Brevard Co.
Barbado Sheep, San Clemente Goat

Table 1 (Continued). Name and location (city and county) of operations maintaining exotic ungulates in Florida, and the numbers and types of exotic ungulates maintained on each operation by region and type of operation, July 1991 - June 1992.

Christos Anthony 34 Bison	Monteverde	Lake Co.
Peterson Fallow Deer, Llama	Eustis	Lake Co.
Bradwood Farms 20 Fallow Deer, 20 Camel, 18 Donkey, 11 Scimitar-horned Oryx, 11 Pere David's Deer, 9 Impala, 8 Axis Deer, 8 Water Buffalo, 7 Formosan Sika Deer, 6 Muntjac, 6 Zebra, 5 Waterbuck, 4 Elk, 4 Addax, 4 Sable Antelope, 3 Eland, 3 Springbok, 3 Watusi, 2 Giraffe, 2 Kudu, 2 Barasingha Deer	Reddick	Marion Co.
Seven Oaks Ranch Bison	Dunnellon	Marion Co.
Quail Roost Farm 200 Fallow Deer, 150 Sika Deer, 75 Axis Deer, 25 Blackbuck, 18 Congo Buffalo, 10 Nilgai, 6 Bison, 6 Watusi, 6 Mouflon, 3 Barasingha Deer, 3 Four-horned sheep, 2 Zebra/Donkey Cross, 1 Llama	Fairfield	Marion Co.
American Indian Childrens NA Goats	Summerfield	Marion Co.
Richard H. Dickerman Sheep, Goat, Llama	Kissimmee	Osceola Co.
Carol Crocker Bison	Kissimmee	Osceola Co.
Robert G. McDole Mouflon	Bushnell	Sumter Co.
JB Acres Bison	Bushnell	Sumter Co.

Table 2. Number of wildlife exhibits, game farms, and hunting preserves permitted in Florida by region, and the number of these that maintained exotic ungulates as of December 1991.

	Wildlife Exhibits		Game Farms		Hunting Preserves		Total	
Region	Permitted	Exotic Ungulates	Permitted	Exotic Ungulates	Permitted	Exotic Ungulates	Permitted	Exotic Ungulates
1	902	6	108	3	16	2	1,026	11
2	319	7	103	9	39	2	461	18
3	256	2	61	3	12	1	329	6
4	853	5	44	5	16	0	913	10
5	794	8	116	11	10	0	920	19
Total	3,124	28	432	31	93	5	3,649	64

Table 3. Number of exotic ungulates in Florida by type of operation, July 1991 - June 1992.

SPECIES	Hunting Preserves	Game Farms	Wildlife Exhibits	Total	Percent
Fallow Deer	357	784	130	1271	20.54
Axis Deer	282	286	65	633	10.23
Sika Deer	67	449	26	542	8.76
Barbado Sheep	221		158	379	6.13
Goat	192	10	118	320	5.17
Blackbuck	76	115	64	255	4.12
American Bison	3	210	8	221	3.57
Thomson's Gazelle			177	177	2.86
Mouflon		31	96	127	2.05
Impala		13	106	119	1.92
Nyala		24	76	100	1.62
Domestic Cattle		9	86	95	1.54
Llama		3	89	92	1.49
African Pigmy Goat			84	84	1.36
Elk	14	65		79	1.28
Scimitar-horned Oryx	2	27	43	72	1.16
Waterbuck		14	50	64	1.03
Reticulated Giraffe		14	49	63	1.02
Eland	4	24	32	60	0.97
Greater Kudu		13	47	60	0.97
Aoudad	1	25	33	59	0.95
Nilgai Antelope	6	16	37	59	0.95
Zebra		9	45	54	0.87

Table 3. (continued)

SPECIES	Hunting Preserves	Game Farms	Wildlife Exhibits	Total	Percent
Grevy's Zebra		11	43	54	0.87
Dromedary Camel		20	28	48	0.78
Water (Asiatic) Buffalo	32	8	3	43	0.70
Grant's Gazelle			40	40	0.65
Sitatunga			39	39	0.63
Vietnamese Pot-bellied Pig		10	27	37	0.60
Addax	1	4	32	37	0.60
Grants Zebra			35	35	0.57
Defassa Waterbuck			34	34	0.55
Dama Gazelle		27	6	33	0.53
Gaur		21	12	33	0.53
Cape (African) Buffalo		21	10	31	0.50
White-bearded Wildebeest			30	30	0.48
Donkey		18	12	30	0.48
Bongo Antelope		21	8	29	0.47
Java Banteng		22	5	27	0.44
Sable Antelope		4	23	27	0.44
Springbok		3	24	27	0.44
Muntjac		11	15	26	0.42
Roan Antelope		12	14	26	0.42
Addra Gazelle			26	26	0.42
Wild Boar			25	25	0.40
Barasingha deer		11	10	21	0.34
Domestic Horses			19	19	0.31
Oryx (Gemsbok)			19	19	0.31

Table 3. (continued)

SPECIES	Hunting Preserves	Game Farms	Wildlife Exhibits	Total	Percent
Kob			19	19	0.31
Reindeer			19	19	0.31
Reeves Muntjac			18	18	0.29
White Rhinoceros		5	13	18	0.29
Gerenuk		13	3	16	0.26
Tapirs			16	16	0.26
Soemmering's Gazelle			16	16	0.26
Bontebok		16		16	0.26
Slender-horned Gazelle		8	7	15	0.24
Dorcas Gazelle			15	15	0.24
European Wisent			14	14	0.23
Red Lechwe		13	1	14	0.23
Red Deer	8		6	14	0.23
Blesbok			12	12	0.19
Pere David's Deer		11		11	0.18
Arabian Oryx			11	11	0.18
Guanaco			10	10	0.16
Kirk's (?) Dik-Dik			10	10	0.16
Dall Sheep			10	10	0.16
Ibex	10			10	0.16
Nile Lechwe			8	8	0.13
Maxwell's Duiker			8	8	0.13
Indian Muntjac			8	8	0.13
Black Rhinoceros			8	8	0.13
Malayan Tapir			7	7	0.11

Table 3. (continued)

SPECIES	Hunting Preserves	Game Farms	Wildlife Exhibits	Total	Percent
Baird's Tapir			7	7	0.11
Angolan Springbok			7	7	0.11
Chamois			6	6	0.10
South American Tapir			6	6	0.10
Collared Peccary			6	6	0.10
Bactrian Camel			5	5	0.08
Red Sheep			5	5	0.08
Common Hippopotamus			5	5	0.08
Indian Rhinoceros			5	5	0.08
Pygmy Hippopotamus			4	4	0.06
Lechwe			4	4	0.06
Persian Onager			4	4	0.06
Goral			3	3	0.05
Hunter's Hartebeest			3	3	0.05
Gray Duiker			3	3	0.05
Yellow-Backed Duiker			3	3	0.05
Black-backed (Bay) Duiker			3	3	0.05
Topi			3	3	0.05
Okapi		3		3	0.05
Four-horned sheep		3		3	0.05
Blue Duiker			2	2	0.03
Blue Wildebeest			2	2	0.03
Burmese Brow-Antlered Deer			2	2	0.03
Chinese Water Deer			2	2	0.03
Mule Deer		2		2	0.03

Table 3. (continued)

SPECIES	Hunting Preserves	Game Farms	Wildlife Exhibits	Total	Percent
Yak	2			2	0.03
Prairie Bison			1	1	0.02
Algerian Sand Gazelle			1	1	0.02
Alpaca			1	1	0.02
Baringo Giraffe			1	1	0.02
Total animals =	1278	2439	2491	6208	
Number of species =	17	45	95	103	

Table 4. Number of fallow, axis, and sika deer, sheep, goats, blackbuck antelope, and bison on hunting preserves, game farms, and wildlife exhibits in Florida by region, July 1991 - June 1992.

	Region 1	Region 2	Region 3	Region 4	Region 5	Total
Fallow Deer	220	440	247	33	331	1,271
Axis Deer	195	115	82	111	130	633
Sika Deer	25	226	75	40	176	542
Sheep	309	26	9	4	31	379
Goat	139	92	10	28	51	320
Blackbuck	62	75	17	60	41	255
Bison	5	130	40	6	40	221
Total	955	1,104	480	282	800	3,621

Table 5. Diseases of concern associated with game ranching/farming of cloven-hoofed animals as determined by attendees of the Game Farming Symposium in Boise, Idaho, January 1991.

I. Bacterial Diseases
   - A. Brucellosis
     1. *Brucella abortus*
     2. *Brucella suis*
        - a. Rangiferian brucellosis
        - b. Swine brucellosis
     3. *Brucella ovis*
   - B. Tuberculosis
   - C. Johnes Disease/Paratuberculosis

II. Viral Diseases
   - A. Orbiviruses: Bluetongue and Epizootic Hemorrhagic Disease
   - B. Pseudorabies
   - C. Malignant Catarrhal Fever
   - D. Spongiform Encephalopathies (Scrapie, Bovine Spongiform Encephalopathy, Chronic Wasting Disease of Mule Deer)

Table 5. (Continued) Diseases of concern associated with game ranching/farming of cloven-hoofed animals as determined by attendees of the Game Farming Symposium in Boise, Idaho, January 1991.

III. Parasites
A. Elaphostrongylinae: *Parelaphostrongylus tenuis* (meningeal worm) and *Elaphostrongylus cervi*
B. Arterial Worm: *Elaeophora schneideri*
C. Ticks, Mites, Lice
D. Besnoitiosis
E. *Echinococcus*

Figure 1. Map of Florida Game and Fresh Water Fish Commission regions in Florida.

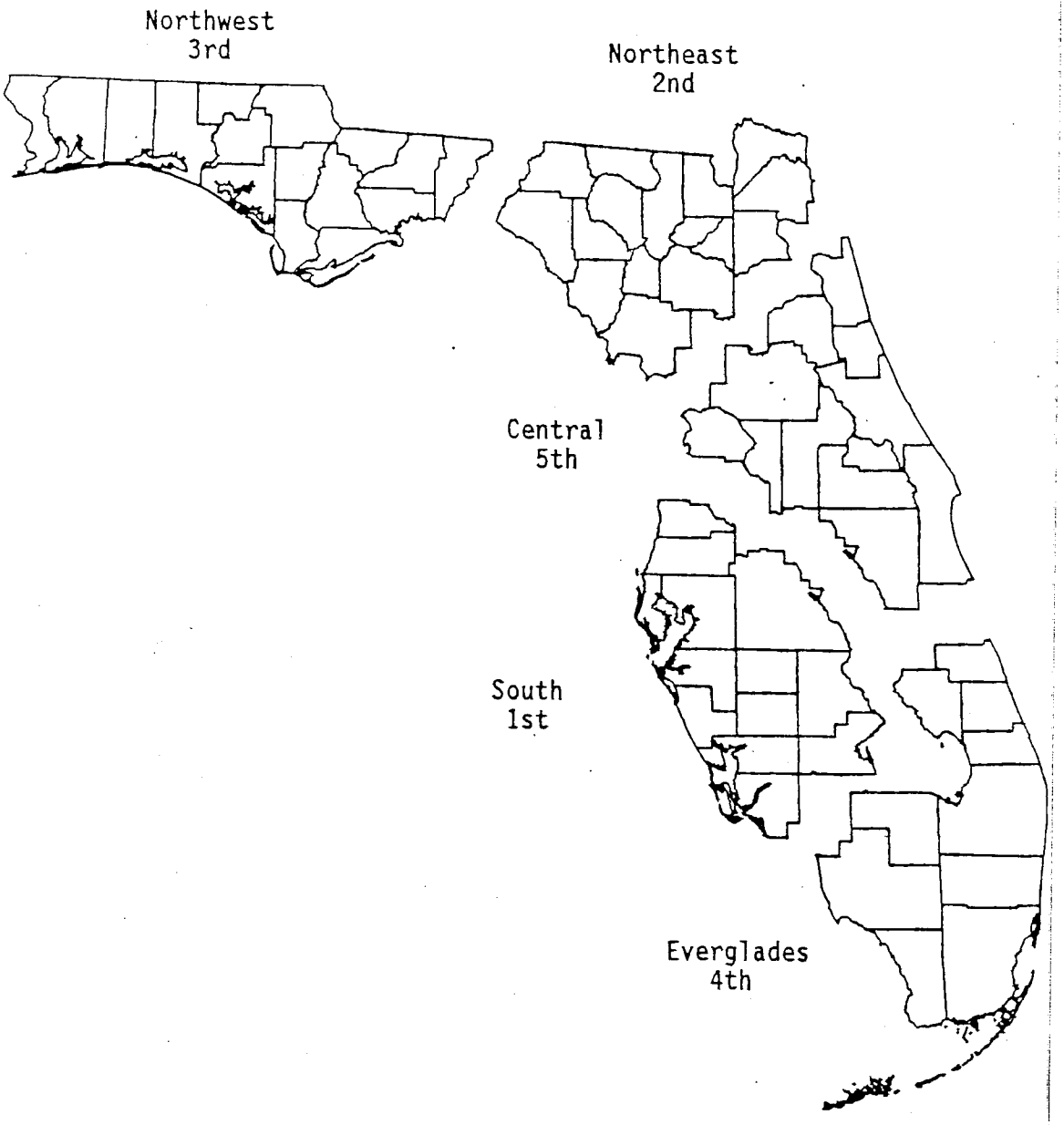
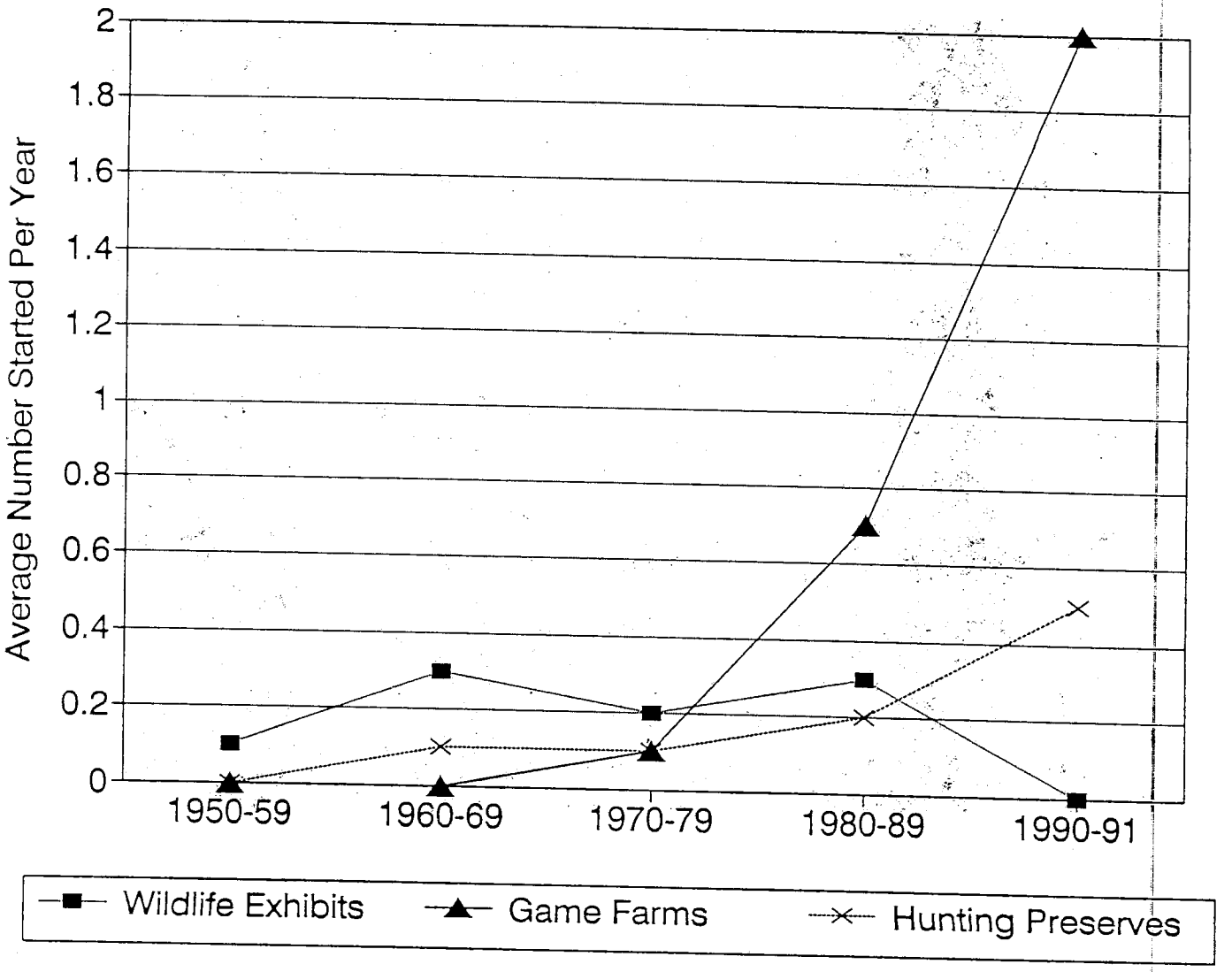

Northwest
3rd
Northeast
2nd
Central
5th
South
1st
Everglades
4th

Figure 2. Growth rate of exotic ungulate operations in Florida by type.


Average Number Started Per Year
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1950-59
1960-69
1970-79
1980-89
1990-91
Wildlife Exhibits
Game Farms
Hunting Preserves

APPENDIX A

Exotic Ungulate Questionnaire

FLORIDA EXOTIC UNGULATE SURVEY

Form No.

Landowner:
Name _____
Address _____ Work Phone_____
_____ Home Phone_____

Manager/Contact:
Name _____
Address _____ Work Phone_____
_____ Home Phone_____

Property Location: _____ County_____
_____

Total Acreage:_____ Acres w/ Exotics:_____ Number of Enclosures:_____

Number And Purpose Of Exotic Ungulates On This Property:

Species Name	Number M	F	Unk	Avg. Born Per Year	Purpose[a]

[a] (A/A = Aesthetic/Altruistic F/G = Family/Guest Hunting VP = Viewing Park LAS = Live Animal Sales M/BP = Meat/By-Products SH = Sport Hunting O = Other)

(Please fill out attached form(s) for each enclosure)

Year Introduced And Source Of Exotic Ungulates On This Property:

Species Name	Year Introduced	Source

What do you do with excess animals (if not hunted)?

Handling and Holding:

Please describe your capture techniques and any special equipment or facilities (e.g., trailers, crates, loading chutes, holding pens, etc.).

Florida Exotic Ungulate Survey (Cont'd)

Parasites, Diseases, Predators, and Injuries:

Have you had any major problems with parasites, diseases, predators, or injuries? Y N
Please describe:

Do you have a consulting veterinarian? Y N
If so, please give name and address of veterinarian:

Do you have quarantine facilities? Y N

White-tailed Deer:

Are WT Deer present on property? Y N
Status of WT Deer on property: Increasing___ Stable___ Declining___
How does WT Deer population compare w/ surrounding land?
Lower___ Same___ Higher___
Do the exotic ungulates share habitat with WT Deer? Y N
Other Comments:

Escapes:

Do you ever have animals escape? Y N

If so, were you able to get them back? Y N

Do you have an escaped animal recapture procedure? Y N
If so, please describe:

Florida Exotic Ungulate Survey (Cont'd)

Legal Aspects:

Do you have problems with trespassers? Y N
Please describe:

Do you have liability insurance? Y N

Do you permanently mark your exotic wildlife? Y N
If so, how:

Would you support a regulation that all exotic wildlife must be permanently marked?
Y N
Comments:

What state laws or regulations would you like to see changed or enacted with regard to exotic ungulates?

Florida Exotic Ungulate Survey (Cont'd)

Harvest Strategy:

Please describe your harvest strategy (bucks only, young of the year, put and take, etc.) for each species of exotic ungulate you own:

Species Name	Harvest Strategy

Fees:

Species Name	Hunting/Lease	Trophy	Guides	Dogs	Care of Meat	Other

Florida Exotic Ungulate Survey (Cont'd)

6

Care of Meat and Trophy:

Please describe care of meat and trophy (field care, aging, cutting/wrapping, cape other):

Business Promotion:

Do you advertise? Y N

How? (please describe)

How would you rate the potential demand and market for exotic ungulates in Florida?

Expanding **Stable** Declining (Please explain)

FLORIDA EXOTIC UNGULATE SURVEY
INDIVIDUAL ENCLOSURE DATA

Landowner/Property Name:_____ Form No._____

Species Held:_____

_____

Size of Enclosure: Total Acres_____ Length_____ Width_____

Fence Type:_____

Fence Height (ft)_____ Mesh Size_____ Wire Gauge_____ Depth In Ground_____

Post Type_____ Post Spacing_____ Other_____

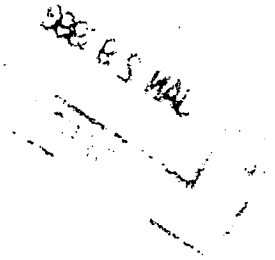
Date Fence Erected_____ **Original Cost**_____ **Original Size**_____

Present Condition Of Fence (circle one) Excellent Good Fair Poor

Number Of Times Per Month Fence Is Inspected_____ **Annual Repair Costs $**_____

How Much Of Enclosure Is: Wooded_____% Brushy_____% Open_____%

Special Habitat Management: (please describe modifications and improvements, e.g. mechanical manipulation, chemical control, fertilization, water development, reseeding, vegetation, livestock grazing, multispecies grazing, supplemental feeding/minerals, etc.)



Other Notes and Comments: